UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/661,448	09/13/2000	Muriel Roger	T2153-906593	7843

181 7590 06/04/2004	EXAMINER	
MILES & STOCKBRIDGE PC	KIM, JUNG W.	
1751 PINNACLE DRIVE	ART UNIT	PAPER NUMBER
SUITE 500	2132	
MCLEAN, VA 22102-3833		6

DATE MAILED: 06/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

		Application No.	Applicant(s)
Office Action Summary		09/661,448	ROGER ET AL.
		Examiner	Art Unit
		Jung W Kim	2132

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.
2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _8-21_ is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) _8-21_ is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on _13 September 2000_ is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a) ☒ All   b) ☐ Some * c) ☐ None of:
    1. ☒ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. _____.
    3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)
1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _5_.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1.   Claims 8-21 have been examined. Applicant has canceled claims 1-7 and added

new claims 8-21 in the preliminary amendment filed on September 13, 2000.

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of
> making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the
> art to which it pertains, or with which it is most nearly connected, to make and use the same and shall
> set forth the best mode contemplated by the inventor of carrying out his invention.

3.   Claims 10 and 17 are rejected under 35 U.S.C. 112, first paragraph, as failing to

comply with the enablement requirement. The claim(s) contains subject matter which

was not described in the specification in such a way as to enable one skilled in the art to

which it pertains, or with which it is most nearly connected, to make and/or use the

invention. The claims define the limitation wherein the table is a matrix and is indexed in

columns by subscripts of the formulas appearing in the negative part of the Horn

clauses and the lines are the Horn clauses exactly; however, the specification only

discloses the table as a matrix that is indexed in columns by subscripts of the formulas

appearing in the negative part of the Horn clauses and lines that are indexed by

subscripts of the formulas appearing in the positive part of the Horn clauses (see

Specification, page 6, lines 15-19).

4.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5.   Claims 8-13, 15, and 17-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6.   Claim 8 recites the limitations "the records", "the implications resolvent of the subformulas", "the clause", "the specific language of the machine", "the positive part of the clause", "the link", and "the implicated subformula(s)". There is insufficient antecedent basis for these limitations in the claim.

7.   Regarding claim 8, the phrase "i.e." renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

8.   Claim 9 recites the limitation "the formulation of the specification". There is insufficient antecedent basis for this limitation in the claim.

9.   Claim 10 recites the limitation "the lines". There is insufficient antecedent basis for this limitation in the claim.

10.   Claim 11 recites the limitation "the implicit lines". There is insufficient antecedent basis for this limitation in the claim.

11.   Claims 12 and 13 recite the limitation "the same formula". There is insufficient antecedent basis for this limitation in the claims.

12.   Claim 15 recites the limitations "the records", "the implications resolvent of the subformulas", "the clause", "the specific language of the machine", "the link", "the implicated subformula(s)", "the formulation of the specification", and "the information from the table". There is insufficient antecedent basis for these limitations in the claim.

13.   Regarding claim 15, the phrase "i.e." renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

14.   Claim 17 recites the limitation "the lines". There is insufficient antecedent basis for this limitation in the claim.

15.   Claim 18 recites the limitation "the implicit lines". There is insufficient antecedent basis for this limitation in the claim.

16.   Claims 19 and 20 recite the limitation "the same formula". There is insufficient

antecedent basis for this limitation in the claims.

Claim Rejections - 35 USC § 103

17.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

18.   This application currently names joint inventors. In considering patentability of

the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g)

prior art under 35 U.S.C. 103(a).

19.   Claims 8-9, 14-16 and 21 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Smaha et al. U.S. Patent No. 5,557,742 (hereinafter Smaha) in view

of Thuraisingham et al. U.S. Patent No. 5,694,590 (hereinafter Thuraisingham) and

Schoning Logic for Computer Scientists (hereinafter Schoning). As per claims 15 and

16, Smaha discloses a computer system comprising storage means and means for

executing programs for implementing a high performance resolution method for deleting

attacks against the system wherein the method:

> a.   formulates audit conditions to be detected using non-limiting specification
>
> formulas expressing fraudulent entry or attack patterns or abnormal operations to
>
> be verified by examining the records of a log file of the computer system (see
>
> Smaha, Abstract, Figures 2b, 3, 4, and 5a).

20.   Smaha is silent on the matter of expanding the formulas into Horn clauses to

detect attack conditions. However, the use of Horn clauses to articulate rules in a

security framework is well implemented in the art. Thuraisingham discloses a method

for detecting security violations in a secure database wherein data and constraints are

modeled into Horn clauses to process the security risk of the data and to obtain a

conflict resolution (see Thuraisingham, col. 14, lines 30-46). It would be obvious to one

of ordinary skill in the art at the time the invention was made to apply the teaching of

Thuraisingham to the invention disclosed by Smaha. Motivation for such an

implementation enables the invention to utilize the consistency and completeness of

Horn clause logic programs to determine the security threat as taught by

Thuraisingham. In addition, although Thuraisingham does not cover in detail how rules

are specified into Horn clauses, means to do so are found in Schoning. Schoning

teaches a method for taking literals, representing an atomic formula being either a

positive or negative (see Schoning, page 18, definition of literal), defining a set of

formulas from a set of literals having CNF form (see Schoning, pages 19-23), then

converting the formulas to Horn formulas, resolving and testing for satisfiability (see

Schoning, pages 23-24, especially page 23, last paragraph and page 24, 'efficient test for satisfiability'; pages 29-35, section 1.5, Resolution, especially page 30-31, definition of resolvent and page 32, Exercise 29). It would be obvious to one of ordinary skill in the art at the time the invention was made to apply the teaching of Schoning to the invention covered by Smaha. Motivation for such an implementation utilizes standard means for assigning and translating data/constraints to Horn clauses. Hence, this method covers the following steps:

b.   expands the formulas into subformulas (see Schoning, page 19, Theorem; page 23, formula F, last equation);

c.   scans by an interpreter, and generates, for each expanded formula in each record, Horn clauses to resolve in order to detect whether or not the formula is valid in the record, the Horn clauses expressing the implications resolvent of the subformulas for each record scanned, in positive clauses, wherein at most one positive literal is counted, and in non-positive clauses, wherein at least one negative literal is counted, which negative literals form the negative part of the clause (see Schoning, page 23, definition of Horn formula; pages 29-35, section 1.5, Resolution, especially pages 30-31, definition of resolvent);

d.   stores positive Horn clauses in a stack of worked subformulas, and storing, in a table comprising a representation, implicating subformula(s) constituting the positive part of the clause, and stores in a counter the number of formulas or subformulas present in the negative part of the clause for each

implicated subformula (see Schoning page 35, 'algorithm to decide satisfiability');

and

e.   resolves the table based on each positive clause encountered, so as to

generate either an output file or an action of the computer system (see Smaha,

Figure 5a, Reference Nos. 32 and 42 as modified by Schoning, page 35,

'algorithm to decide satisfiability'; pages 117-131, section 3.2, Horn Clause

Programs).

21.   Finally, the above steps is implemented by means of: an adaptor for translating

information from a log file into a language comprehensible to an interpreter (see Smaha,

Figure 5a, Reference No. 12 as modified by Schoning, page 3, 'atomic sentences'); an

interpreter for receiving a formulation of a specification in a temporal logic in a

specification formula in order to expand the formula and fill in the table and the stack of

worked subformulas stored in the memory of the computer system and resulting from

the scanning of the computer system's log file (see Smaha, Figure 5a, Reference Nos.

144 and 142; col. 9, lines 56-67 as modified by Schoning, page 4-5, definition for syntax

and semantics of propositional logic; page 9, definition of suitable assignment, model,

satisfiable, valid; pages 14-23, section 1.2 Equivalence and Normal Forms); and a

clause processing algorithm for resolving the Horn clauses to generate an output file or

an action (see Smaha, Figure 5a, Reference Nos. 32 and 42 as modified by Schoning,

page 35, 'algorithm to decide satisfiability'; pages 117-131, section 3.2, Horn Clause

Programs). The aforementioned cover claims 15 and 16.

22.   As per claim 21, Smaha covers a computer system as outlined above in the claim 15 rejection under 35 U.S.C. 103(a). Although Smaha does not expressly disclose scanning the log file only once from the beginning to the end, it is notoriously well-known in the art to implement means to reduce the number of runs for a given task to a minimum. The examiner takes Official Notice of this teaching. It would be obvious to one of ordinary skill in the art at the time the invention was made to scan the log file completely only once. Motivation for such an implementation would eliminate redundant work.

23.   As per claims 8-9 and 14, they are method claims corresponding to claims 15-16 and 21 and they do not teach or define above the information claimed in claims 15-16 and 21. Therefore, claims 8-9 and 14 are rejected as being unpatentable over Smaha in view of Thuraisingham and Schoning for the same reasons set forth in the rejections of claims 15-16 and 21.

24.   Claims 10-13 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smaha in view of Thuraisingham and Schoning, and further in view of Cormen et al. Introduction to Algorithms (hereinafter Cormen). As per claims 17 and 18, Smaha covers a computer system as outlined above in the claim 15 rejection under 35 U.S.C. 103(a). Smaha does not expressly disclose representing the table in the form of a matrix or a sparse matrix having columns represented by means of chained lists and implicit lines. However, as taught by Cormen, these means are the two standard

ways to represent relationships between data of a set with at least one other data of the set (see Cormen, page 465, 3rd paragraph, first sentence; page 466, Figure 23.1). It would be obvious to one of ordinary skill in the art at the time the invention was made to apply the teaching of Cormen to the invention covered by Smaha, since sparse matrix and matrix formations are the two standard means of representing relations between data of a set.

25.   As per claims 19 and 20, Smaha covers a computer system as outlined above in the claim 15 and 16 rejections under 35 U.S.C. 103(a). Smaha does not expressly disclose the use of a hash table in the step of expanding formulas into subformulas. However, in a different section, Cormen teaches the use of hash tables to efficiently devise a one-to-one mapping structure as an alternative to a direct addressing scheme (see Cormen, pages 221-222, section 12.2, 'Hash Tables'). Formulas stored in a hash table rather then a direct addressing scheme to be expanded into subformulas would be more efficient since the universe of formulas would probably be much greater then the actual number of formulas to be expanded. It would be obvious to one of ordinary skill in the art at the time the invention was made to apply the teaching of Cormen to the invention covered by Smaha. Motivation for such an implementation enables the formulas to be uniquely addressed but stored in manner that is better optimized for a subset of formulas drawn from a large set of possible formulas as taught by Cormen.

26.   As per claims 10-13, they are method claims corresponding to claims 17-20 and

they do not teach or define above the information claimed in claims 17-20. Therefore,

claims 10-13 are rejected as being unpatentable over Smaha in view of Thuraisingham,

Schoning, and Cormen for the same reasons set forth in the rejections of claims 17-20.

Conclusion

The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure.

Thuraisingham et al. U.S. Patent No. 5,355,474.

Cohen U.S. Patent No. 5,481,650.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Jung W Kim whose telephone number is (703) 305-

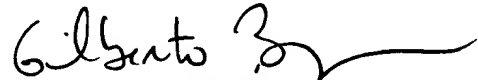8289. The examiner can normally be reached on M-F 9:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Gilberto Barron can be reached on (703) 305-1830. The fax phone number

for the organization where this application or proceeding is assigned is 703-872-9306.

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Jung W Kim
Examiner
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Jk
May 24, 2004

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